An Overarching Framework for Understanding and Assessing Life Skills

F ew people would argue against the idea that there are skills and abilities necessary for success in life. Asking people to name them, however, would generate a wide variety of responses. This should not be surprising, since skills and abilities important to one person may not be as important to another. Differences may arise from occupation (e.g., corporate executive vs. assembly line worker), lifestyle (e.g., head of a large household vs. single with no dependents), or society and culture (e.g., industrialized vs. non-industrialized). Despite these differences, there has been a great deal of interest in trying to look across individual and cultural contexts to identify and measure a common, definable core of necessary skills and abilities. This is where the Adult Literacy and Lifeskills survey begins—as an attempt to identify and measure a range of skills that are linked to social and economic success with the goal of developing profiles that capture variations across groups and the environments they operate in.

Understanding these empirical linkages is important for both public policy and individual choice (OECD and Statistics Canada; OECD and HRDC). First, skill is thought to be an important force driving aggregate economic performance and inequality in educational and economic opportunity at the individual level. Skill is also thought to play a central role in the generation of and access to social capital (Bourdieu and Coleman), and to support the development of and access to democratic institutions (Freire, 1970).

We do not begin with a blank slate. Recently, there has been a proliferation of efforts in the fields of education and labor to develop lists of skills, knowledge, and competencies necessary for success in the workplace and society. Thus, our effort could be as simple as reviewing these studies to identify the one we find most appropriate, or a set of skills common to most of them. As appealingly straightforward as this sounds, this body of research is not the only one relevant to our purposes. Indeed, throughout this century, researchers from a variety of fields have sought to identify models and systems to describe concepts very similar to, if not the same as, life skills. Most prominent among these is the work that has been done to define human intelligence. Because current notions of intelligence extend well beyond academic knowledge, one might at first expect them to resemble the sets of employability skills identified by the education and labor researchers. Examining the two together, however, reveals striking contrasts in approaches and language. For example, predominant workplace skill models frequently originate from inventories of tasks encountered in jobs and everyday situations. On the other hand, models of intelligence seek to identify products and processes of abilities, referring to skills and tasks only as a means of exemplifying and measuring these abilities, or as subcategories of them.

Having examined work in both of these fields, we believe that not only are both perspectives necessary for an accurate model of life skills, but that they complement rather than contradict each other. It should be possible, then, to integrate these two types of theories into a conceptual framework for life skills such that they support and add depth to

each other. In addition, were we to examine additional fields of inquiry, we believe that this conceptual framework for life skills would continue to center on these core theories, that would then be greatly enhanced by the depth and complexity brought to bear by additional perspectives. For the purposes of this paper though, we have limited our review to the work of these two core areas—employability skills derived from job and task analysis and psychological theories of intelligence—and incorporate both to propose our conceptual framework. We do so to initiate the academic and theoretic discussion and to simultaneously commence some empirical work in the area. We then discuss how, at least in theory, this framework can be used to develop "life skills profiles" of people and of job requirements. We conclude by proposing an assessment of a subset of the possible array of life skills identified in this overarching framework.

In establishing a framework we distinguish among three levels of criteria that reduces the number of skills to be measured at this time. Our first criterion is to identify a list of skill domains for which there appears to be scientifically convincing theory and an established literature. Thus, some intuitively appealing skill domains will be eliminated for lack of scientific underpinnings at this time. Second, there must be an accompanying tradition of measurement to draw upon. Thirdly, the measurement technology that exists must be sufficiently compact to provide valid reliable and comparable measures within the natural limits of a household survey of very heterogeneous adult populations within highly developed OECD countries. In this manner the Adult Literacy and Lifeskills survey supports the development and use of the life skills framework and the concept of life skills profiles.

We acknowledge that the proposed framework is potentially incomplete, that it

would be likely to have greater depth were we to incorporate other disciplines and perspective points of view. In this regard the work of DeSeCo is likely to play an increasingly important role in interpreting the skill set the ALL can effectively measure at this time. In addition, the DeSeCo project is likely to expand and enhance the theoretical coherence of life skills. In turn, ALL will provide empirical evidence to support and confront theory building. Given this context, our goal is not to pen the "last word" on life skills, but rather to establish a large enough foundation for future work. The many different efforts to identify life skills have resulted in a large variety of classification systems, each with its own unique nomenclatures. As our ability to assess a wider range of skills and abilities increases, we believe it is important to begin to synthesize this continually expanding body of knowledge into an overarching framework to help guide assessment efforts. Doing so will help us see both how far we have come and how far we have yet to go. The proposed framework is a work in progress and will undoubtedly require refinements in the future, but it is one that enables us to move forward with a clearer vision of the direction of the project.

What Are Life Skills?

In identifying life skills, it is useful to define what they should represent. As a start, we can be clear about what they *do not* represent. For example, many factors can contribute to one's success in life, but not all of them can be considered "skills." People often attribute their success to such factors as luck, socioeconomic status, physical and social surroundings, fate, or divine intervention. While we do not deny the importance of any of these factors, they are well beyond the scope of ALL. Furthermore,

although skills and abilities related to strength, fitness, and physical dexterity have traditionally been important to success in life, we limit our discussion to non-physical abilities.

It is also important to emphasize that life skills must be connected to success in life. There are many skills, talents, and abilities that do not meet this criterion, even though they may involve sophisticated intellectual processes. This means that not all academic abilities are necessarily life skills, nor are all life skills likely to be taught in school. This criterion also means that we must recognize that these skills will not be the same—or will not be valued equally—in even a limited range of cultural settings. For instance, we expect that cross-cultural differences in life skills may echo the research on the concept of intelligence. As Sternberg and Kaufman (1998) point out in their review of related literature, at the extreme Western cultures tend to emphasize "technological intelligence" (Mundy-Castle, 1974), generalization or going beyond the information given (Connolly & Bruner, 1974; Goodnow, 1976), speed (Sternberg, 1985a), minimal moves to a solution (Newell & Simon, 1972), and creative thinking (Goodnow, 1976). In Eastern cultures, by contrast, Buddhist and Hindu philosophies stress waking up, noticing, recognizing, understanding, and comprehending, in addition to determination, mental effort, and feelings (Das 1994). African conceptions of intelligence focus on skills that help facilitate and maintain harmonious and stable inter-group relations (Ruzgis & Grigorenko, 1994). But, even in the more limited range of countries included in OECD, variation in valued skills is expected.

Because of this necessary subjectivity, our goal in developing a set of life skills is not to establish a single set of benchmarks for people to use to evaluate their successes in life.

Instead, we hope to develop a framework comprised of skills that may have varying importance for different individuals or in different societies but which, when looked at as a whole, accommodate definitions of success used by most individuals and by most societies.

Finally, our definition of life skills should address how they are used. The most common way—and the way that appears in conventional definitions of intelligence—is through *adaptation* to the environment (Sternberg and Detterman, 1986). For example, people must adapt to workplace environments and to new responsibilities as their family lives change. Even people involved in creative endeavors, such as authors, artists, and entertainers, must take into account the tastes of their audiences, markets, or clients, as well as changes in the available technologies of production. Individuals can, however, use life skills to *shape* their environments, such as when a worker modifies a piece of machinery or a production process to increase comfort or efficiency. When neither adaptation nor selection leads to a successful interaction with the environment, individuals can use life skills to *select* a new environment, such as when a person decides to change workplaces, move to a new location, or become friends with a new group of people.

Therefore, for the purposes of this study, we define life skills as: skills or abilities individuals need in order to achieve success in life, within the context of their socio-cultural milieu, through adaptation to, shaping of, and selection of environments.

In the following sections we will examine various theories and models related to life skills to see if there is consensus or convergence on particular skills that fit the definition we have just created.

Deriving Life Skills from Lists of Workplace Skills

The existing body of work on skills necessary for employment success is clearly relevant for our purposes. This perspective has recently received increased attention through the release of several documents setting out lists of such skills. These studies and reports cite a need to identify generalizable skills and abilities necessary to better prepare people for success in an ever-changing economy. In so doing, they call attention—sometimes explicitly and sometimes implicitly—to the emerging belief that traditional notions of "basic skills" are not sufficient for success in the workplace. Support for this belief can be found, for example, in the literature on workplace literacy, in which researchers have reported that common school-based notions of reading, writing, and arithmetic are not sufficient for the tasks that adults perform (Sticht, 1978; Mikulecky, 1982; Daggett, 1991). Other researchers looking at job performance found that even in a broadened sense, these three basic skills were not sufficient, and that other skills were also needed (Carnevale et al., 1988). Consequently, new terms and conceptions of basic skills began to emerge.

The term "basic skills" evolved into "employability skills" because these skills were almost always discussed in the context of the transition from school to work or the transition of the unemployed into employment. Although this term is sometimes limited only to those skills necessary for job entry, it usually covers the skills thought necessary to retain jobs and secure advancement, such as those that relate to attitude and work habits. Other terms found in the research include "enabling skills," "generic skills," "core skills," "key competencies," " essential skills," and "necessary skills." These different terms would seem to have slightly different implications, but they were often chosen to meet specific local circumstances and preferences, and, thus, are not related in any systematic way to differences in the way these skills were conceptualized. Despite the strong labor-market orientation of these terms and their sources, many of these documents either directly state or imply their relevance to life in general, making them candidates for "life skills."

Synthesizing the Skills Lists

Over the past ten years, a large number of education- and labor-related organizations have undertaken projects to identify employability skills. These include national, state, and provincial government agencies, school districts, and public and private research institutions. Due to this large number, we have chosen to examine a set of these documents that we believe are representative of the larger group in terms of methodology and findings. These documents include

- People and Skills in the New Global Economy (Premier's Council, 1990)
- Putting General Education to Work: The Key Competencies Report (Committee to Advise the Australian Education Council, 1993)
- Michigan Employability Skills Profile (Pestillo and Yokich, 1988)
- Conference Board Employability Skills Profile (McLaughlin, 1992)
- *Workplace Basics: The Skills Employers Want* (Carnevale, Gainer, and Meltzer, 1988) (developed for the American Society for Training and Development)
- *Work Keys* (American College Testing, 1997)
- *What Work Requires of Schools* (U.S. Department of Labor, 1991) (a report of

the Secretary's Commission on Achieving Necessary Skills (SCANS)

- *National Council on Vocational Qualifications Core Skills* (Oates, 1992) (a system developed for use in the United Kingdom)

- *Essential Skills Research Project* (http://www.hrdc-drhc.gc.ca/hrib/hrp-prh/skills/essentie.html) (a project for Human Resources Development Canada)

The methodology used by these and most of the other studies is generally to start from a broad definition (e.g., "a skill applicable to a wide range of jobs and contexts") and then survey or observe workers, supervisors, and experts to determine what skills are common. Those that pass some test of "frequent enough" across occupations qualify for inclusion in the final list of skills. Aside from terminology, the main differences among the final products have been level of detail and structure. Some simply list a skill (e.g., "reading") while others provide a fuller description of that skill with examples of its application to various situations. Some of the lists provide a single set of skills, but many attempt some sort of categorization or hierarchy. For example, the *Workplace Know-How* from the U.S. Department of Labor's SCANS designates two categories: *Foundation Skills*, which include basic academic skills, thinking skills, and personal qualities; and *Workplace Competencies*, which include the ability to use resources, interpersonal skills, information, systems, and technology (Secretary's Commission on Achieving Necessary Skills, 1991). The Premier's Council Skills Triangle (1990) uses a hierarchy of transferability and generalizability: at the base are *basic* skills, which support *workplace* skills, and these in turn support *job specific* skills. The former two sets of skills are broadly transferable, while the latter set is not.

Despite these differences, a comparison across these lists reveals that they almost always cover the same range of concepts. It should then be possible to distill from them a limited set of categories into which most of the skills listed by any of the nine documents would fit. In some cases, a given list might not address all of the categories in our model, but in as few cases as possible should they contain a skill that does not fit within any of our categories.

The table that follows (see Figure 1) presents our attempt to create such a model. We have chosen six skill areas, some with sub-areas, as follows:

- Communication
    - Speaking
    - Listening
    - Reading
    - Writing
- Mathematical
- Problem Solving
- Intrapersonal
    - Motivation
    - Metacognition
- Interpersonal
    - Teamwork
    - Leadership
- Technology

The first column in the table lists these skills. The other columns contain the comparable skills from each of the nine studies/reports that we reviewed, demonstrating how each of our categories is addressed by a given skills list. We placed skills that did not seem to fit any of our categories in the final row of the table.

Trying to fit a diverse set of models into our framework requires re-arranging the original lists. In addition, although we have maintained the original terminology from the

nine studies, placing the terms into our framework involves varying degrees of interpretation. To allow for comparisons to the original sources, the skills lists from the nine documents are presented in Annex A.

Figure 1: Comparison of Skills Lists, Part I

Skill Category	Skills Triangle from the Premier's Council	Key Competencies Report	Michigan Employability Skills Profile
Communication			
Speaking	Communications	Communicating ideas and information	Speak in the language in which business is conducted
Listening	Communications		Follow written and oral instructions Follow written and oral directions
Reading	Reading and writing Communications		Read and understand written materials Understand charts and graphs Follow written and oral instructions Follow written and oral directions
Writing	Reading and writing Communications	Communicating ideas and information	Write in the language in which business is conducted
Mathematical	Mathematics	Using mathematical ideas and techniques	Understand basic math Use mathematics to solve problems
Problem Solving	Analytic problem solving	Solving problems	Use scientific method to solve problems
Intrapersonal			
Motivation			Attend school/work daily and on time Meet school/work deadlines Work without supervision
Metacognition	Ability to learn		Learn new skills
Interpersonal			
Teamwork	Workplace interpersonal	Working with others and in teams	Actively participate in a group Know the group's rules and values Listen to other group members Express ideas to other group members Be sensitive to the group members' ideas and views Be willing to compromise if necessary to best accomplish the goal Work in changing settings and with people of different backgrounds
Leadership			Be a leader to compromise if necessary to best accomplish the goal
Technology	Generic technical	Using technology	Use tools and equipment
Not included	Firm- and job-specific skills Motor skills	Planning and organizing activities	Use research and library skills Use specialized knowledge and skills to get a job done Develop career plans Know personal strengths and weaknesses Demonstrate self-control Pay attention to details Identify and suggest new ways to get the job done

Figure 1: Comparison of Skills Lists, Part II

	Conference Board Employability Skills Profile	**Workplace Basics: The Skills Employers Want**	**Work Keys Specifications**	**SCANS Competencies and Foundation Skills**
Communication				
Speaking	Communicate	Listening and oral communication		Basic skills (reading, writing, arithmetic and mathematics, speaking, and listening)
Listening	Communicate	Listening and oral communication	Listening	Basic skills
Reading	Communicate	Reading	Reading for information Locating Information	Basic skills
Writing	Communicate	Writing	writing	Basic skills
Mathematical	Think	Computation	Applied mathematics	Basic skills
Problem Solving	Think	Creative thinking/ problem-solving		Thinking skills
Intrapersonal				
Motivation	Positive Attitudes and Behaviours, Responsibility, Adaptability	Self-esteem/ goal-setting-motivation/ personal and career development		Personal qualities
Metacognition	Think, Learn for Life	Learning to learn		Thinking skills
Interpersonal				
Teamwork	Work with Others	Interpersonal/ negotiation/ teamwork	Task Skills Relationship Skills Communication Skills	Use interpersonal skills
Leadership		Organizational effectiveness/ leadership		
Technology	Think		Analyzing the problem Identifying relevant aspects of the problem Understanding the data Choosing appropriate technology Solving the problem Evaluating alternative solutions Extrapolating to novel situations	Use technology
Not included				Use resources Use information Use systems

Figure 1: Comparison of Skills Lists, Part III

	National Council on Vocational Qualifications Core Skills	Essential Skills Research Project
Communication		
Speaking	Communication	Oral Communication
Listening	Communication	Oral Communication
Reading	Communication	Textual Reading Use of documents
Writing	Communication	Writing
Mathematical	Application of Number	Numeracy skills
Problem Solving	Problem-solving	Problem solving, Decision making, Planning/Organizing Job Tasks
Intrapersonal		
Motivation		
Metacognition	Improving own learning and performance	Continuous Learning
Interpersonal		
Teamwork	Working with Others	Working with Others
Leadership		
Technology	Information Technology	Computer Skills
Not included		Psychomotor Skills

Only the Michigan Employability Skills Profile and the SCANS *Workplace Know-How* have a significant number of items that do not have a clear place within our categories. A few, such as "develop career plans" and "pay attention to details" in the Michigan Employability Skills Profile, would seem to be separate skills. Several others, however, appear to involve skills from a combination of the categories in our list. For example, "identify and suggest new ways to get the job done" from the Michigan Employability Skills Profile might incorporate a combination of problem solving, teamwork, and communication. Thus, these skills are not necessarily missing from our model; rather, they might require a restructuring of the categories.

Overall, our skill categories do seem to accommodate the skills identified by the documents that we have chosen to examine and, we believe, would do so for most any other skills list found in the employability skill literature. However, we do not claim completeness. There may very well be other skills or competencies not identified by any of these efforts. If future efforts identify missing elements, then our model should be open to refinements, but the consistency among these studies gives us enough confidence in our initial findings to proceed with our work. A more likely shortcoming than omission is that a simple list of skills does not necessarily provide a sufficient degree of depth for a sophisticated understanding of life skills or a useful system of assessments. Therefore, we will treat our resulting set of life skill categories as a first step in building our overarching framework of life skills.

Deriving Life Skills from Psychological Theories

Efforts to identify formal lists of employability skills are fairly recent

developments. In contrast, the effort to describe and measure human intelligence has a history of over 100 years (Sternberg & Kaufman, 1998). The theories developed fall into a variety of paradigms, such as a psychometric paradigm, a cognitive or computational paradigm, a biological paradigm, an epistemological paradigm, an anthropological paradigm, a sociological paradigm, and a systems paradigm (Sternberg, 1990).

Not all of these paradigms are clearly relevant to our discussion. For example, cognitive theories have been applied primarily to tasks used in the laboratories of cognitive psychologists (e.g., Hunt, 1980) and to psychometric tasks (e.g., Sternberg, 1983), but they have not been equally applied to everyday activities. Thus, it is not clear that they meet our criteria of being necessary for success in life. Biological theories are helpful in relating intellectual functioning to the brain (see Matarazzo, 1994) but do not yet carry any implications for how one might go about understanding or assessing life skills. In an adult context, the epistemological paradigm (Piaget, 1972) has proven very useful for evaluating children's sensorimotor, logical, and scientific thinking skills. It has not, however, been shown to be equally useful for analyzing individual differences in adult performance; this is perhaps because the theory was explicitly proposed as a theory of human commonalities, not as a theory of individual differences. Finally, anthropological and sociological theories (e.g., Berry, 1974; Feuerstein, 1980; Greenfield, 1997; Laboratory of Comparative Human Cognition, 1982) point out the necessity of taking cultural and other contextual variables into account but are far from complete as theories of intelligence, much less life skills.

Because of their comprehensiveness and the fact that they are commonly used to

discuss practical skills and abilities, the theories of greatest interest here are psychometric theories and systems theories. Even after limiting our scope to these two types of paradigms, we are still left with a number of theories that seem to make very different claims. Despite this apparent impasse, we believe that a closer examination reveals that these theories are in fact complementary. An analysis of the two can then lead toward a theory-based concept of a set of life skills, which we can then compare with the set of skills derived from the employability skills literature.

Psychometric Theories

Early psychometric theories of intelligence focused on a single general intellectual ability, G (Spearman, 1904). Although the concept of G is still accepted by many psychometric theorists (see, for example, Jensen, 1998), most modern theories view human abilities as too complex to be captured by a single measure (e.g., Gustafsson, 1988). The large majority of psychometric theorists today accept some kind of hierarchical model with G at the top (e.g., Cattell, 1971) or see G as existing within a range of academic skills (Sternberg, 1997b). In any case, a life skills model requires concepts of intelligence that can be more clearly and more specifically defined, exemplified, and assessed than this broad and elusive concept.

Representative of the hierarchical theories are Cattell (1971), Carroll (1993) and Horn (1994). They describe hierarchies moving from the specific—e.g., spelling ability and speed of reasoning in the Carroll model—to the general—G in the Cattell and Carroll models. While G is too general for our purposes, it is not clear whether all or most of the abilities found at the opposite end of the hierarchy (i.e., specific abilities) would fit our definition of life skills as being necessary for

success in life. For our purposes, the most relevant and useful abilities included in these models are found somewhere in the middle.

Two "middle-level" abilities common to most hierarchical models are *crystallized abilities* (also referred to as *Gc*) and *fluid abilities* (also referred to as *Gf*). Carroll describes crystallized abilities as the accumulated knowledge base, including language development, verbal and printed language, comprehension, and lexical knowledge. Similarly, Horn defines crystallized abilities, or acculturation knowledge, as

> *…measured in tasks indicating breadth and depth of the knowledge of concepts and forms of reasoning that have been developed by humans over the course of many centuries and passed on from one generation to the next.* Gc *can be thought of as the intelligence of the culture that is incorporated by individuals through a process of acculturation (p. 443).*

Carroll's description of fluid abilities centers on reasoning abilities, namely, general sequential reasoning, inductive reasoning, and quantitative reasoning. Horn defines fluid abilities as

> *measured in tasks requiring inductive, deductive, conjunctive, and disjunctive reasoning to arrive at an understanding of relations among stimuli, to comprehend implications, and to draw inferences (p. 443).*

We believe that these two abilities, crystallized and fluid, are essential to our model of life skills for several reasons. First, it is easy to conceive that acquisition of them in some way or another is necessary for success in life. Second, they appear distinct— an important quality as many of the skills and abilities uncovered in our search for life skills are similar or overlapping. Whereas tests of

fluid ability primarily measure the results of current information-processing skills (reasoning), tests of crystallized ability, in contrast, primarily measure the result of previously applied information-processing skills (comprehension). In addition, although measures of the two abilities may show some statistical correlation, the number of studies separating them as distinct factors (Carroll, 1993) is so large that there seems to be little argument for their relative, although not total, independence. Finally, the two abilities show different patterns of growth and decline with age (Horn, 1994). Fluid ability tends to increase from infancy onward until the late 20s or early 30s and then to start a period of usually gradual decline. Crystallized ability tends to increase until rather late in life and only then begins to show some decline.

Other abilities frequently appear in psychometric theories. Most prominent among them is *spatial visualization* (*Gv*), an ability associated with spatial problem-solving (Horn, 1976). While we must keep these other abilities in mind, of the abilities found in psychometric models, crystallized and fluid abilities are the most distinct and widely accepted, and, thus, present the most compelling case for inclusion as distinct components of the ALL life skills framework.

Successful Intelligence

Even if we were to consider spatial visualization and other less commonly mentioned abilities in addition to the predominant fluid and crystalized abilities, psychometric theories alone do not provide a comprehensive set of intellectual abilities necessary for success in life. Because they have their origins in their attempts to describe and measure different types of thinking, they are less focused on how people relate to their surroundings, which is a primary criterion of life skills. Sternberg (1985, 1997a, 1997b) has attempted to address this shortcoming through

his three-part (triarchic) theory of *successful intelligence*. He uses this term to emphasize the importance of intelligence as the abilities needed for life success, thereby distinguishing it from the narrower conception of intelligence that is popular in the psychometric literature.

Sternberg argues that there are three major aspects of successful intelligence—analytical, creative, and practical. Analytical abilities are those abilities used to analyze, evaluate, judge, compare, contrast, and critique. Creative abilities are those abilities used to create, invent, discover, suppose, imagine, and hypothesize. Practical abilities are those abilities used to put into practice, apply, use, and implement knowledge and skills. The three sets of abilities are hypothesized to be statistically relatively independent but to be psychologically intertwined because the same information-processing components underlie all three. What differ are the situational contexts in which the components are used. Analytical abilities tend to be used in situations that are relatively more familiar, creative abilities in situations that are relatively less familiar, and practical abilities in situations that are highly contextualized with respect to the individual's daily life.

It is important to note that the term "creative abilities" does not refer to the high levels of creativity shown by world-famous authors, artists, or scientists. Rather, it is being used in the much more mundane sense of people's abilities to deal flexibly with relatively unfamiliar problems, abilities to cope with relative novelty (Sternberg, 1985). For example, creativity in the sense it is used here is involved when workers on an assembly line formulate a strategy for more quickly moving their parts of products down the line (see Scribner, 1984). These abilities have appeared in only in a minority of psychometric theories of intelligence (e.g., Guilford, 1967).

The theory of successful intelligence adds two important elements to the consensus view that has emerged from our consideration of psychometric theories. First, it emphasizes the importance of the distinction between coping with familiar and with novel tasks and situations. Research suggests that people who are able to cope well with familiar tasks and situations are not those who are always flexible in coping with novel tasks and situations (Sternberg, 1985; Sternberg & Lubart, 1995). But in any job or personal relationship, for that matter, one will be confronted with novel tasks. An assessment of life skills therefore needs a balance of both. This idea is implicit in the distinction between fluid abilities (which can be, but need not be, applied to more novel tasks) and crystallized abilities (which are typically applied to more familiar tasks); the theory of successful intelligence simply makes this point explicit.

The theory of successful intelligence also emphasizes the importance of the processes rather than just the products of intellectual functioning. This emphasis has been implicit in many psychometric theories. For example, although Spearman is most well-known for his structural theory of general ability, he published an entire book on the processes he proposed might underlie *G* (Spearman, 1923). His book detailed three of the so-called "qualitative" processes—apprehension of experience (what is called "encoding" in the theory of successful intelligence), eduction of relations (what is called "inference" in the theory of successful intelligence), and eduction of correlates (what is called "application" in the theory of successful intelligence). Thurstone's (1938) theory, although not as process oriented, was seen by its originator as a step along the way toward a process theory (Thurstone, 1947). And Guilford's (1967) theory had processes as one of the three dimensions of the cube that

Guilford proposed to represent the structure of intellect.

The degree to which these three abilities are distinct from those proposed by psychometric models—and therefore require treatment as discrete components—can be seen in how well they are measured by conventional psychometric assessments. Analytical abilities, with their close relation to reasoning abilities (fluid abilities), are measured fairly well by conventional assessments. Creative abilities tend to be measured less well by such tests, although the extent to which conventional tests measure creative abilities seems to be proportional to the novelty of the test material. Thus, fluid ability tests that are relatively novel, such as the Raven Progressive Matrices, probably tap into creative abilities, at least more so than do other tests (Sternberg & Lubart, 1995). (In this case, however, it is important to emphasize that what captures creative abilities is not the fact that these are fluid ability tests—which would imply similarities to fluid ability—but their unfamiliar nature.) Practical abilities are measured least well by conventional tests (Sternberg, et al 1995), as evidenced by accounts of people whose ability to develop fairly complex procedures for executing tasks related to their jobs cannot be predicted by their IQs (Sternberg & Kaufman, 1998).

Proposed Domains for Life Skills Derived from Psychological Theories

For our purposes, the theory of successful intelligence is best seen as extending along the same dimension of psychometric models. Both describe types of thinking and have some degree of overlap. A review of psychometric models points to the importance of crystallized and fluid abilities. The successful intelligence model begins with analytical abilities, which can be seen as overlapping at least fluid abilities and perhaps crystallized abilities as

well. But the successful intelligence model takes us further, addressing people's relationship to the environment through the domains of practical abilities and creative abilities. Thus, as a set of core domains of intelligence with clear relationships to success in life, we propose the following:

- **Crystallized Analytical Abilities**—Acculturation knowledge. Evident in tasks that show an indication of the breadth and depth of the knowledge of concepts and forms of reasoning that have been developed by humans over the course of many centuries and passed on from one generation to the next. Tests of crystallized abilities primarily measure the result of previously applied information-processing skills.

- **Fluid Analytical Abilities**—Reasoning abilities, such as sequential, inductive, deductive, and quantitative. Tests of fluid abilities primarily measure the results of current information-processing skills.

- **Practical Abilities**—Abilities used to practice, apply, use, and implement knowledge and skills. These abilities are highly contextualized with respect to the individual's daily life and involve the management of oneself, management of others, and management of tasks.

- **Creative (Coping with Novelty) Abilities**—Abilities to create, invent, discover, suppose, imagine, and hypothesize. Characterized by people's abilities to deal flexibly with relatively unfamiliar problems—that is, their abilities to cope with relative novelty.

Connecting the Findings: A Proposed Life Skills Framework

In the preceding sections, we examined attempts from two widely different fields to describe skills or abilities that people need to succeed in life. In both cases, we reviewed a variety of documents and drew from them frameworks of categories based on convergence around certain skills and abilities. With regard to the documents from which they were drawn, we believe the frameworks to be fairly complete: no commonly accepted skills, abilities, or categories were omitted. We believe that they could accommodate most of the theories and models in their respective fields.

It is perhaps no surprise that these two efforts with seemingly similar topics reach such very different conclusions. They do, after all, take very different approaches in examining human abilities. The employability skills models look at the skills required by the many tasks that people face in the workplace and create general categories that are applicable across a variety of situations. The psychological models, on the other hand, look at only the type of thinking in which people commonly engage, with little regard to the context. Neither approach is inherently wrong; both can be considered appropriate given the different interests and perspectives of the fields from which they originate. If the major difference between the two is one of perspective, and the two approaches are indeed talking about a the common concept of life skills, or at least something roughly comparable to it, then our examination of life skills should be enhanced only by incorporating both of these perspectives.

We propose that the relationship between the two models is as follows:

The skills derived from the employability skills literature are the context areas in which the four types of thinking derived from the psychological theories take place; and conversely,

In each of the skill categories, people can engage in primarily four types of thinking

represented by the four categories derived from the psychological theories.

This relationship is represented by the matrix below (see Figure 2).

According to this proposed relationship, the skills within a skill area can be classified by the type of thinking they involve. Taking the example of mathematical skills, crystallized mathematical skills, such as recalling mathematical facts and formulas, easily come to mind. Fluid mathematical skills might allow a person to solve mathematical problems, whereas practical mathematical skills would enable a person to apply his/her mathematical skills to a situation found on the job. Finally, creative

mathematical skills might, for example, allow a person to design a mathematical solution for a seemingly non-mathematical situation. Each of these cases occurs in mathematics; yet there are clear differences among them.

If we look at the four types of thinking, providing an example of any one of them requires describing a context, such as using creative thinking to develop a new software application, or using fluid thinking to select an appropriate dosage of medicine based on the instructions on the package. The examples might describe a highly specialized situation, such as identifying a faulty part on an airplane engine or writing a computer program to predict seismographic activity. In the vast majority of cases, however, they all can be described, at some level, by a skill found within our skills categories derived from employability skills studies.

Figure 2: Proposed Framework for Life Skills

	Crystallized Analytical (recall)	Fluid Analytical (reasoning, information processing)	Practical Abilities (standard applications- one's own life)	Creative Abilities (novel situations)
Communication				
Speaking				
Listening				
Reading				
Writing				
Mathematical				
Problem Solving				
Intrapersonal				
Motivation				
Metacognition				
Interpersonal				
Teamwork				
Leadership				
Using Technology				

Linking the two perspectives in this manner is not simply a convenient way of reconciling two seemingly disparate models. It makes discussions of life skills more focused by adding a greater level of precision to the employability skills categories and providing a means for describing the thinking abilities. For example, given two individuals leading teams, one might perform their duties adequately by employing strategies common within the company, while the other might devise a new strategy more tailored to the project and the team members. Both would be employing teamwork skills, but it would be inaccurate to say both were using the same type of skills. Similarly, it is easy to imagine a person who can calculate the amount of carpet required to cover all the floors in a house but who might not understand a set of instructions explaining how to do so. In this case, is it fair to say that the person has practical abilities, or is it more appropriate to say that he or she has practical mathematics abilities but few practical reading skills?

Describing situations to characterize each of the cells in our matrix forces us to re-examine the meanings of the terms in each model and the relationships of the categories to each other within the same model. In most cases, the differences between the skill categories appear clear and the categories appear fairly discrete (although one might argue that problem solving can take place within a mathematical or technological setting, or that using technology requires communication and mathematical skills). In contrast, as we move across the domains of thinking skills, they are not necessarily independent of one another. In the example cited earlier regarding leading a project team, the individual devising the new strategy—a creative thinker—may very well base those new strategies on what he or she has learned in business school or commonly used at the company, thus tapping into crystallized thinking. Furthermore, creating a new strategy may require an evaluation of how well different strategies would work, which requires fluid thinking. Without further exploration, it is premature to label these four categories as constituting a hierarchy, but it is important to recognize the possibility that this relationship exists.

It is also premature to provide anything other than tentative examples for each of the cells. In the table on the next page (see Figure 3), we have begun to place examples in some of the cells. In some cases, they represent commonly occurring tasks and situations that are distinct from others in the same row or column. In other cases, the examples may seem more obscure, contrived, or similar to other examples in the same row or column. We recognize that further work in developing examples for each cell may require refinements in our model. And, perhaps more importantly, this ultimately may be a product of the ALL assessments themselves.

Figure 3: Tentative Examples of Life Skills

	Crystallized Analytical (recall)	Fluid Analytical (reasoning, information processing)	Practical Abilities (standard applications- one's own life)	Creative Abilities (novel situations)
Communication	——	——	——	——
Speaking	Speaking (diction, clarity, using words correctly)		Speaking in different situations	Speaking to achieve goal
Listening	Comprehension of spoken words	Understanding and interpretation of meaning	Listening in variety of situations	Understanding non-standard speech or type of material
Reading	Reading from text	Understanding and interpretation of meaning	Reading variety of documents	Understanding non-standard language use or material
Writing	Mechanics of writing and grammar		Writing various types of documents	Writing (fiction or non) to achieve particular goal
Mathematical	Recall of facts, theorems, and formulas	Solving equations or doing geometric proofs	Applying math to everyday situations	Designing mathematical solution strategies
Problem Solving	Knowledge of standard problem-solving strategies	Deducing solution to problem	Choosing from existing set of solution strategies	Designing solution strategies
Intrapersonal	——	——	——	——
Motivation				
Metacognition				
Interpersonal	——	——	——	——
Teamwork	Comprehension of one's role in group		Participating in team	Taking on new, unfamiliar assignment
Leadership	Knowledge of common team structures and strategies	Identifying strengths and weaknesses of team members	Applying strategies	Designing strategies (based on goals, resources, strengths of team members)
Using Technology	Keyboarding, logging on	Troubleshooting	Using different software applications	Creating software for unique situations; devising information search strategies

Applicability of the Framework to Other Theories and Perspectives

For our framework to be valid, it should be able to accommodate not only the theories from which it is derived, but also other attempts to describe life skills, types of thinking, employability skills, and similar concepts. It is not necessary that the proposed model agree in either terminology or level of detail with other models and theories, but it does need to be conceptually compatible to them. Many theories regarding skills, abilities, and intelligence sound quite different from the proposed framework. Often, however, the differences arise from the fact that these other theories go beyond identifying skills and abilities to describing how they are acquired, developed, and influenced by family and society. This is the case with most sociological and anthropological theories, for example. Yet, if there are theories with a purpose similar to ours that include skills our model does not, or if they contain a structure proposing a different relationship among the elements we have identified, then the proposed framework will need to be re-examined.

One prominent theory of intelligence that we have not examined thus far is the theory of *multiple intelligences* developed by Howard Gardner (Gardner, 1983). It is a psychological theory that identifies eight discrete kinds of intelligence: linguistic, logical-mathematical, spatial, interpersonal, intrapersonal, naturalist, bodily-kinesthetic, and musical. These intelligences have been identified via a retrospective analysis that has allowed for the consideration and addition of new intelligences that can meet established criteria for discreteness. Although it is a psychological theory, it does not always fit along the same dimension as the psychometric theories and the theory of successful intelligence we have considered.

There are certain overlaps with the psychometric theories. One could argue that Gardner's description of linguistic intelligence is very closely related to crystallized abilities and that logical-mathematical intelligence sounds similar to fluid abilities. At the same time, all of the intelligences could also be seen as domains in which intelligent thinking processes—such as those described by psychometric models and the model of successful intelligence—can take place. One can easily conceive of crystallized, fluid, practical, and creative thinking taking place within each of the intelligences. In the case of linguistic intelligence, for example, one can read a short story (crystallized), analyze it (fluid), devise a way to apply the message of it to everyday life (practical), or write an alternative ending to it or write a short story of one's own (creative). Thus, in many ways, these intelligences are more similar in nature to the skills identified from the employability skills literature.

Several of the intelligences, however, go beyond the skills listed in our framework. We will not seek to argue whether naturalist intelligence, bodily-kinesthetic intelligence, and musical intelligence are truly intelligences. We do believe, however, that their generalized relevance to job performance might be less than that of other skills or intelligences. For example, few jobs outside the field of music require any demonstrated level of musical intelligence. While many people who pursue musical interests find that it enriches their lives, it would be difficult to argue that musical intelligence is necessary for success in life. A similar argument can be made regarding naturalist intelligence.

Overall, comparing the theory of multiple intelligence against our proposed life skills framework reveals that, while the intelligences do not fit neatly only as skills (the left-most column in the matrix) or only as domains of

thinking (the top row), the type of abilities they describe are captured in various places throughout the framework. We believe that comparisons with other theories of intelligence or frameworks of employability skills would result in a similar degree of consistency.

Envisioning Life Skills "Profiles"

The proposed framework describes what skills a comprehensive set of life skills contains. If it is valid, it should be relevant across a wide variety of people and contexts. Where differences arise, however, is in the *amount* of each skill a person possesses or a context requires. In other words, while most people need communication skills, some people have and need more than others, such as in the case of a reporter or a counselor. Similarly, a particular occupation might require all four types of thinking skills, but might rely less on creative than on crystallized abilities. Extending the proposed framework to address skill levels creates a potentially powerful tool for describing people and contexts (e.g., cultures, occupations, and lifestyles).

Figure 4 below presents a hypothetical life skills profile. It is based on the matrix of the proposed life skills framework, and indicates the relative amounts of each skill the person possesses. In this case, the person possesses fairly strong communication skills and has strong creative abilities in some instances. Rather than focusing on a particular person, the same profile could be used to describe skills required of a particular job. Profiles such as this one could be developed to describe both individuals and occupations and to compare similarities and differences in strengths and emphases.

It is important to remember that these profiles are highly theoretical by nature. The ability to conceive of life skills far exceeds the ability to assess them, and even further exceeds the ability to assess them as a unified set within practical constraints by using comparable methodology and scales. The profiles do, however, serve as useful heuristic devices, not only to help envision the potential applications of a life skills framework, but also to better understand and refine the framework itself.

Figure 4: A Theoretical Life Skills "Profile"
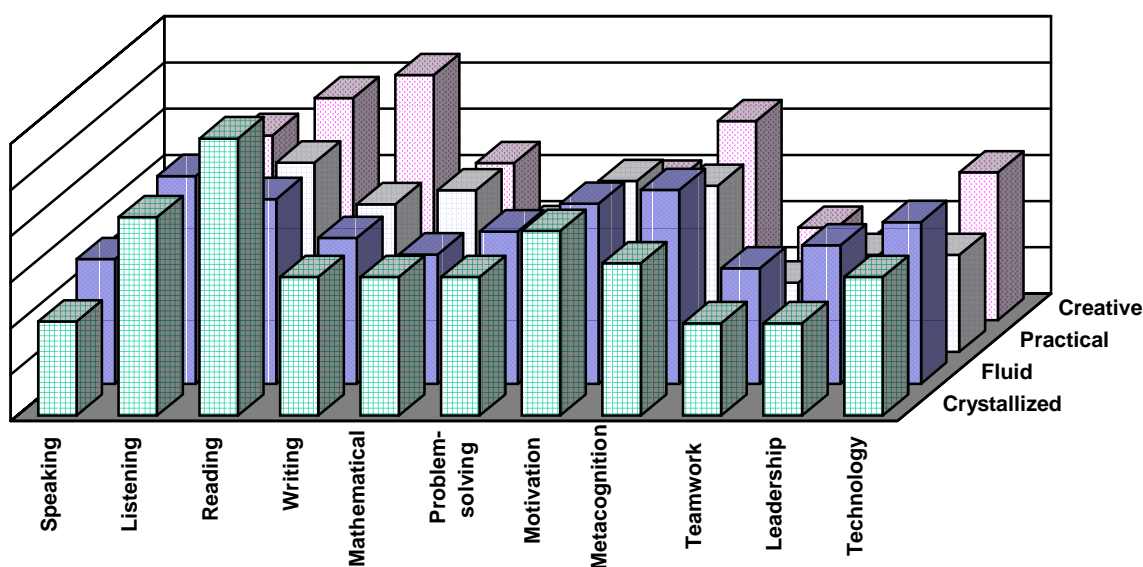
Measuring Life Skills

The ultimate purpose of the proposed life skills framework is to help guide the assessment efforts of the ALL project. Due to the variety of work being done in the area of assessing life skills and cognitive abilities, the assessment efforts within the ALL project could follow very different paths. The proposed framework provides a unifying direction for assessment efforts by establishing a limited set of life skills to be assessed and by establishing relationships among life skills according to their skill area and the type of thinking involved. Having a vision for what an ideal set of assessments would look like not only ensures consistency in development, but also assists in gauging progress along the way.

The proposed framework requires that any assessment efforts be viewed in terms of two characteristics: the type of skill assessed (e.g., reading, teamwork) and the type of thinking assessed (e.g., crystallized, creative). Doing so makes the development of assessments all the more challenging, as efforts to assess just one characteristic are themselves incomplete. As described earlier, there have been many efforts to identify employability skills, but few of the projects have assessment efforts associated with them. Assessments measuring different types of thinking ability have a considerably longer history, but conventional methods primarily focus upon crystallized and fluid thinking, while assessments of practical and creative abilities are less well developed and not commonly accepted.

Not surprisingly, if we compare existing ALL assessment efforts with the proposed framework, they only address a fairly limited range of life skills. Currently, assessments are being developed in seven areas:

Prose Literacy—focuses on the knowledge and skills needed to understand and use information from texts that contain extended prose organized in a typical paragraph structure found in materials such as editorials, news stories, brochures and pamphlets, manuals, and fiction.

Document Literacy—focuses on the knowledge and skills required to locate and use information in qualitatively different printed materials that contain more abbreviated language and use a variety of structural devices to convey meaning. These include tables, charts, graphs, indices, diagrams, maps, and schematics.

Numeracy—addresses the ability to interpret, apply, and communicate mathematical information in commonly encountered situations (adapted from Queensland Department of Education, 1994). Numerate behaviour is observed when people manage a situation or solve a problem in a real context, and involves responding to mathematical information that may be represented in multiple ways; it requires the observation of a range of enabling knowledge and behaviour processes.

Analytical Reasoning—involves the ability to apply cognitive processes toward determining a solution when that solution is not immediately obvious to the problem solver. The ALL definition of problem solving takes a "project approach" that focuses on the competencies needed for the regulation of actions in complex tasks.

Teamwork—focuses on the core skill competencies associated with successful and effective teams and teamwork. To this end, three primary competencies required for effective Teamwork are proposed: Group Decision Making/Planning, Adaptability/Flexibility, and Interpersonal Relations. A fourth competency, Communication, underlies all three competencies and serves as a bridge between them.

Information and Communication Technology Literacy—includes access to computers, self-assessment of computer-related attitude and ability, use of and experience with computers, methods used in the development of computer skills, and use of and experience with related technology.

The table below (see Figure 5) presents what a cross-mapping of ALL assessments to the framework might look like, placing the initials of each assessment in appropriate cells

Figure 5: Current ALL Frameworks

	Crystallized Abilities	Fluid Abilities	Practical Abilities	Creative Abilities
Communication				
Speaking				
Listening				
Reading	PL, DL	PL, DL	PL, DL	
Writing	PL, DL	PL, DL	PL, DL	
Mathematical	N	N	N	
Problem Solving	AR	AR		
Intrapersonal				
Motivation				
Metacognition				
Interpersonal				
Teamwork	TW			
Leadership				
Using Technology	ICTL			

At this time, we believe that of the assessments, the Prose Literacy, Document Literacy, Numeracy, and Analytical Reasoning assessments are likely to address more than one category of thinking ability. This points to a need for future assessment development to expand across a wider range of abilities, creative abilities in particular. Although coping with novelty and flexible thinking are required in some of the assessments, none of the assessments are explicitly designed to tap flexible thinking and the ability to cope with novel kinds of tasks and situations. This is, of course, quite challenging, as these abilities are the most difficult ones to measure and the ones with which psychometricians have the least experience.

In many regards, the ALL assessments are venturing into new territory. Because the entire range of life skills is large, it may not be practical or desirable to address all of the cells in the life skills framework. Priority areas will have to be chosen. However, as efforts to develop assessments evolve, the framework

can serve as a valuable method for identifying those priority areas, and for ensuring philosophical consistency across all of the assessments.

Conclusion

The framework for life skills presented here is ambitious—it seeks to establish a unifying relationship among theories about skills and intelligence that have widely varying purposes, perspectives, and language. As a result, one might argue that it is incomplete, that it takes liberties with the original theories, or that the relationships proposed are less valid in some instances than in others. It derives strength, however, from the fact that it is based on consensus found within the two types of theories it examines: employability skills and psychological models. Further, it generally accommodates other theories, examples of contextual applications of skills and thinking abilities, and the assessments developed for the ALL project. Future work in the area of life skills may require modifications to the framework but, even in its initial state, it provides an important theoretical foundation for the ALL project. Not only does it address the many

different models and theories that have been developed to describe concepts similar to life skills, it distills a comprehensive set of life skills from this convergence. It is intended that this set can accommodate other theories and models, so that future consideration of them does not result in completely new sets of skills and abilities that need to be addressed. The framework also creates a useful means of examining the assessment efforts of the ALL project. By placing them into the framework, it is possible to gauge how "complete" the efforts are and to identify possible areas for future assessment development. Finally, the framework can contribute to the overall vision for the project, focusing both theoretical and practical discussions on what life skills are and how an understanding of them can help enrich people's lives.

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Annex A: Workplace Skill Lists

1. Skills Triangle from People and Skills in the New Global Economy

- Not Portable Workplace Skills:
    - Firm and Job Specific Skills
- Portable Workplace Skills:
    - Generic Technical
    - Analytic Problem Solving
    - Workplace Interpersonal
- Portable Basic Skills:
    - Motor Skills
    - Mathematics
    - Reading and Writing
    - Ability to Learn
    - Communications

2. Key Competencies from Putting General Education to Work: The Key Competencies Report

Collecting, Analyzing, and Organizing Information	The capacity to locate, sift and sort information in order to select what is required and present it in a useful way, and evaluate both the information itself and the sources and methods used to obtain it.
Communicating Ideas and Information	The capacity to communicate effectively with others using the range of spoken, written, graphic, and other non-verbal means of expression.
Planning and Organizing Activities	The capacity to plan and organize one's own work activities, including making good use of time and resources, sorting out priorities and monitoring one's own performance.
Working with Others and in Teams	The capacity to interact effectively with other people both on a one-to-one basis and in groups, including understanding and responding to the needs of a client and working effectively as a member of a team to achieve a shared goal.
Using Mathematical Ideas and Techniques	The capacity to use mathematical ideas, such as number and space, and techniques, such as estimation and approximation, for practical purposes.
Solving Problems	The capacity to apply problem-solving strategies in purposeful ways, both in situations where the problem and the desired solution are clearly evident and in situations requiring critical thinking and creative approaches to achieve outcomes.
Using Technology	The capacity to apply technology, combining the physical and sensory skills needed to operate equipment with the understanding of scientific and technological principles needed to explore and adapt systems.

3. Michigan Employability Skills Profile

Academic Skills
- Read and understand written materials
- Understand charts and graphs
- Understand basic math
- Use mathematics to solve problems
- Use research and library skills
- Use specialized knowledge and skills to get a job done
- Use tools and equipment
- Speak in the language in which business is conducted
- Write in the language in which business is conducted
- Use scientific method to solve problems

Personal Management Skills
- Attend school/work daily and on time
- Meet school/work deadlines
- Develop career plans
- Know personal strengths and weaknesses
- Demonstrate self-control
- Pay attention to details
- Follow written and oral instructions
- Follow written and oral directions
- Work without supervision
- Learn new skills
- Identify and suggest new ways to get the job done

Teamwork Skills
- Actively participate in a group
- Know the group's rules and values
- Listen to other group members
- Express ideas to other group members
- Be sensitive to the group members' ideas and views
- Be willing to compromise if necessary to best accomplish the goal
- Be a leader to compromise if necessary to best accomplish the goal
- Work in changing settings and with people of differing backgrounds

4. Conference Board Employability Skills Profile

- Academic Skills
    - Communicate
    - Think
    - Learn
- Personal Management Skills
    - Positive Attitudes and Behaviours
    - Responsibility
    - Adaptability
- Teamwork Skills
    - Work with Others

5. Skills List from Workplace Basics: The Skills Employers Want

- 3R's, Reading, Writing, Computation
- Learning to learn
- Communication: Listening and Oral Communication
- Creative Thinking/Problem Solving
- Interpersonal/Negotiation/Teamwork
- Self-Esteem/Goal Setting-Motivation/Personal and Career Development
- Organizational Effectiveness/Leadership

6. American College Testing *WorkKeys* Specifications

- Locating and Using Information
- Reading for Information
- Listening
- Writing
- Applied Mathematics
- Teamwork
- Applied Technology (assessed as problem-solving skills)
- Observation

7. SCANS Competencies and Foundation Skills

Workplace Competencies Effective Workers Can Productively Use:

Resources	They know how to allocate time, money, materials, space, and staff.
Interpersonal Skills	They can work on teams, teach others, serve customers, lead, negotiate, and work well with people from culturally diverse backgrounds.
Information	They can acquire and evaluate data, organize and maintain files, interpret and communicate, and use computers to process information.
Systems	They understand social, organizational, and technological systems; they can monitor and correct performance; and they can design or improve systems.
Technology	They can select equipment and tools, apply technology to specific tasks, and maintain and troubleshoot equipment.

Foundations Skills Competent Workers in the High-Performance Workplace Need:

Basic Skills	Reading, writing, arithmetic and mathematics, speaking, and listening.
Thinking Skills	The ability to learn, to reason, to think creatively, to make decisions, and to solve problems.
Personal Qualities	Individual responsibility, self-esteem and self-management, sociability, and integrity.

8. NCVQ Core Skills

- Communicate
    - Discussions
    - Write
    - Use images
    - Read and respond
- Application of Number
- Problem Solving
- Information Technology
- Personal Skills
    - Improving own learning and performance
    - Working with others

9. Essential Skills Research Project

- Reading Skills
    - Textual Materials
    - Graphical Materials
- Writing Skills
- Numeracy Skills
- Psychomotor Skills
- Oral Communication Skills
- Thinking Skills
    - Problem Solving
    - Decision making
    - Planning/Organizing Job Tasks
- Working with Others
- Computer Skills
- Continuous Learning